

**Non-Provisional Patent Application of Jian W. Mulligan
for “Composite Roof and Wall System—Three-in-One—
Fireproof, Insulation and Waterproofing”**

CLAIMS: What is claimed is:

1. A composite roof and wall system, three-in-one: fireproof, insulation and waterproofing, comprising an expanded polystyrene foam board adhered onto the existing roof deck or wall by using a tough modified bitumen waterproofing membrane coating as the adhesive to glue onto the existing roof or wall substrate and connected with each other by construction tape, such as butyl tape, or by using the modified bitumen waterproofing membrane coating to seal the seams between the foam boards; the waterproofing membrane is fully brushed, rolled or sprayed over the foam boards with a mesh material placed over said tough waterproof membrane coating for reinforcement; and a composition of cement, clay, perlite, sand, etc. to form a tough cover is placed over the mesh by brushing or rolling or spraying onto said system to protect it from fire, physical and weather damages.
2. A composite roof and wall system, three-in-one: fireproof, insulation and waterproofing, comprising according to claim 1 wherein said expanded polystyrene foam board must be rigid and non-flammable and is between 2 inches

to 8 inches in thickness, placed on the surface of said tough waterproof membrane coating freshly and well brushed or rolled or sprayed onto the surface of the existing roofs or walls as the first waterproofing coating.

3. A composite roof and wall system, three-in-one: fireproof, insulation and waterproofing, comprising, according to claim 1 wherein said tough waterproofing material is made of modified asphalt emulsion with natural and synthetic resins, applying two to three times onto the roof or wall surface using 0.125 to 0.25 gallon per square yard.
4. A composite roof and wall system, three-in-one: fireproof, insulation and waterproofing, according to claim 1 wherein said reinforcement medium mesh is woven polyester type of mold and mildew free and non-flammable or non-combustible having a weight between 0.01 to 1 ounces per square yard depending on the needs.
5. A composite roof and wall system, three-in-one: fireproof, insulation and waterproofing, according to claim 1 wherein said lightweight tough coat comprising cement, clay, silicate (perlite), sand, etc., mixed with water to make it into paste form at job site and having a thickness of said paste between 0.125 inches to 0.75 inches, using said lightweight tough coat mixture between 3 to 10 pounds per square yard and allowing twenty days or so to be fully cured.

6. A composite roof and wall system, three-in-one: fireproof, insulation and waterproofing, according to claim 1, claim 2, claim 3, claim 4 and claim 5, said tough waterproofing membrane coating having excellent elongation ability and tough cover featuring fire and ultra violet related weather resistance, said foam board insulation being not necessary needed for the flat or inclined roofs or walls.
7. A composite roof and wall system, three-in-one: fireproof, insulation and waterproofing, according to claims 1 through 5, said system also being pre-constructed into the forms of boards, shingles or tiles.
8. A composite roof and wall system, three-in-one: fireproof, insulation and waterproofing, according to claim 1, claim 2 and claim 6, said expanded polystyrene foam boards used as the base of said boards, shingles or tiles.
9. A composite roof and wall system, three-in-one: fireproof, insulation and waterproofing, according to claim 1, claim 3 and claim 7, tough waterproofing coating is applied to the surface of said board by brushing, rolling or spraying onto the surface of said board, playing the waterproofing role of said system.
10. A composite roof and wall system, three-in-one: fireproof, insulation and waterproofing, according to claim 1, claim 4 and claim 8, said mesh material is laid over the surface of the tough waterproof coating when freshly applied.

11. A composite roof and wall system, three-in-one: fireproof, insulation and waterproofing, according to all the above claims, said tough cover, a protective lightweight concrete coating material being brushed, or rolled or sprayed onto said mesh laid over the surface of tough waterproof membrane coating to avoid any physical or weather damages, said system of said boards, shingles and tiles being formed after a natural curing period of 20 days at 10.0 or higher centigrade degrees.
12. A composite roof and wall system, three-in-one: fireproof, insulation and waterproofing, according to claim 11, said system of pre-constructed boards, shingles and tiles laid over the existing roofs or walls, using a tough waterproof membrane coating to adhere and said tough waterproofing coating being well applied onto the surface of the existing roofs or walls to double the waterproofing of said composite roof and wall system, whereby a structure will have strong three-in-one: fireproof, insulation and waterproofing, system.